

AMENDMENTS TO THE CLAIMS

The listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

Claims 1-19 (Canceled)

20. (Currently Amended) An optical transmission system comprising:

a transmitter outputting signal light in which ~~a plurality of signal channels with an optical frequency spacing of~~ an optical frequency spacing between the adjacent ones of a plurality of signal channels is 400 GHz or more but 12.5 THz or less ~~are multiplexed;~~

an optical fiber transmission line transmitting the signal light;

an optical fiber for Raman amplification constituting at least part of said optical fiber transmission line; and

Stimulated-Raman-Scattering means which Raman-amplifies the signal light in said optical fiber for Raman amplification, by supplying Raman amplification pumping light,

wherein said Stimulated-Raman-Scattering means includes a pumping light source outputting the Raman amplification pumping light which includes a plurality of pumping channels, and the plurality of pumping channels are assigned to the same part of said optical transmission line the plurality of pumping channels having wavelengths different from those of the plurality of signal channels, at least a part of the plurality of pumping channels being located between predetermined Raman gain peaks.

21. (Previously Presented) A system according to claim 20, wherein said transmitter includes a directly-modulation laser, and

wherein said optical fiber for Raman amplification has a negative chromatic dispersion at each signal channel.

22. (Currently Amended) A system ~~according to claim 20~~, comprising:
a transmitter outputting signal light in which an optical frequency spacing between the adjacent ones of a plurality of signal channels is 400 GHz or more but 12.5 THz or less;
an optical fiber transmission line transmitting the signal light;
an optical fiber for Raman amplification constituting at least part of said optical fiber transmission line; and

Stimulated-Raman-Scattering means which Raman-amplifies the signal light in said optical fiber for Raman amplification, by supplying Raman amplification pumping light,

wherein said Stimulated-Raman-Scattering means includes a pumping light source outputting the Raman amplification pumping light which includes a plurality of pumping channels,

wherein a nonlinear refractive index of said optical fiber for Raman amplification does not become lower than 3.5×10^{-20} [m²/W].

23. (Currently Amended) An optical transmission system comprising:
a transmitter outputting signal light in which ~~a plurality of signal channels with an optical frequency spacing of~~ an optical frequency spacing between the adjacent ones of a plurality of signal channels is 400 GHz or more but 12.5 THz or less ~~are multiplexed;~~

an optical fiber transmission line transmitting the signal light; and

Stimulated-Raman-Scattering means which includes at least part of said optical fiber transmission line as an optical fiber for Raman amplification constituting at least part of said optical fiber transmission line, which includes a pumping light source which supplies Raman amplification pumping light containing two or more pumping channels multiplexed to said optical fiber transmission line ~~while the multiplexed pumping channels are assigned to the same part of said optical fiber transmission line~~, and which Raman-amplifies the signal light by supplying the Raman amplification pumping light,

wherein said pumping light source outputs the Raman amplification pumping light in which an optical frequency of each pumping channel ~~contained in the pumping light~~ is so set as to locate a peak of Raman gain at an optical frequency different from an optical frequency of each signal channel contained in the signal light, and

~~wherein~~ an optical frequency spacing between the adjacent pumping channels in the Raman amplification pumping light ~~[[is]]~~ being not less than 4680GHz , at least one of pumping channels in the Raman amplification pumping light containing a plurality of longitudinal modes.

24. (Previously Presented) A system according to claim 23, wherein said transmitter includes a directly-modulation laser, and

wherein said optical fiber for Raman amplification has a negative chromatic dispersion at each signal channel.

25. (Previously Presented) A system according to claim 23, wherein, of said optical fiber transmission line, at least a transmission line section functioning as said optical fiber for Raman amplification has a negative chromatic dispersion at each signal channel.

26. (Currently Amended) A system ~~according to claim 23~~, comprising:
a transmitter outputting signal light in which an optical frequency spacing between the adjacent ones of a plurality of signal channels is 400 GHz or more but 12.5 THz or less;
an optical fiber transmission line transmitting the signal light; and
Stimulated-Raman-Scattering means which includes at least part of said optical fiber transmission line as an optical fiber for Raman amplification constituting at least part of said optical fiber transmission line, which includes a pumping light source which supplies Raman amplification pumping light containing two or more pumping channels multiplexed to said optical fiber transmission line, and which Raman-amplifies the signal light by supplying the Raman amplification pumping light,
wherein said pumping light source outputs the Raman amplification pumping light in which an optical frequency of each pumping channel is so set as to locate a peak of Raman gain at an optical frequency different from an optical frequency of each signal channel contained in the signal light, an optical frequency spacing between the adjacent pumping channels in the Raman amplification pumping light being not less than 4,680 GHz,

wherein a nonlinear refractive index of said optical fiber for Raman amplification does not become lower than 3.5×10^{-20} [m²/W].

27. (Currently Amended) A system ~~according to claim 23~~, comprising:

a transmitter outputting signal light in which an optical frequency spacing between the adjacent ones of a plurality of signal channels is 400 GHz or more but 12.5 THz or less;

an optical fiber transmission line transmitting the signal light; and

Stimulated-Raman-Scattering means which includes at least part of said optical fiber transmission line as an optical fiber for Raman amplification constituting at least part of said optical fiber transmission line, which includes a pumping light source which supplies Raman amplification pumping light containing two or more pumping channels multiplexed to said optical fiber transmission line, and which Raman-amplifies the signal light by supplying the Raman amplification pumping light,

wherein said pumping light source outputs the Raman amplification pumping light in which an optical frequency of each pumping channel is so set as to locate a peak of Raman gain at an optical frequency different from an optical frequency of each signal channel contained in the signal light, an optical frequency spacing between the adjacent pumping channels in the Raman amplification pumping light being not less than 4,680 GHz,

wherein let m be the number of pumping channels of the pumping light, and n be the number of signal channels of the signal light, the number of pumping channels and the number of signal channels satisfy the following relation:

$$m \leq n/2.$$

28. (Currently Amended) A system ~~according to claim 23~~, comprising:

a transmitter outputting signal light in which an optical frequency spacing between the adjacent ones of a plurality of signal channels is 400 GHz or more but 12.5 THz or less;

an optical fiber transmission line transmitting the signal light; and

Stimulated-Raman-Scattering means which includes at least part of said optical fiber transmission line as an optical fiber for Raman amplification constituting at least part of said optical fiber transmission line, which includes a pumping light source which supplies Raman amplification pumping light containing two or more pumping channels multiplexed to said optical fiber transmission line, and which Raman-amplifies the signal light by supplying the Raman amplification pumping light,

wherein said pumping light source outputs the Raman amplification pumping light in which an optical frequency of each pumping channel is so set as to locate a peak of Raman gain at an optical frequency different from an optical frequency of each signal channel contained in the signal light, an optical frequency spacing between the adjacent pumping channels in the Raman amplification pumping light being not less than 4,680 GHz,

wherein let m be the number of pumping channels of the pumping light, and n be the number of signal channels of the signal light, the number of pumping channels and the number of signal channels satisfy the following relation:

$$m \leq (n + 4)/2.$$

29. (Currently Amended) A system ~~according to claim 23,~~ comprising:

a transmitter outputting signal light in which an optical frequency spacing between the adjacent ones of a plurality of signal channels is 400 GHz or more but 12.5 THz or less;

an optical fiber transmission line transmitting the signal light; and

Stimulated-Raman-Scattering means which includes at least part of said optical fiber transmission line as an optical fiber for Raman amplification constituting at least part of said

optical fiber transmission line, which includes a pumping light source which supplies Raman amplification pumping light containing two or more pumping channels multiplexed to said optical fiber transmission line, and which Raman-amplifies the signal light by supplying the Raman amplification pumping light,

wherein said pumping light source outputs the Raman amplification pumping light in which an optical frequency of each pumping channel is so set as to locate a peak of Raman gain at an optical frequency different from an optical frequency of each signal channel contained in the signal light, an optical frequency spacing between the adjacent pumping channels in the Raman amplification pumping light being not less than 4,680 GHz,

wherein said optical fiber for Raman amplification has the value $MPI_{\text{crosstalk}}$ of 30 dB or less.

30. (Currently Amended) An optical transmission system comprising:

a transmitter outputting signal light in which ~~a plurality of signal channels with an optical frequency spacing of~~ an optical frequency spacing between the adjacent ones of a plurality of signal channels is 400 GHz or more but 12.5 THz or less ~~are multiplexed;~~

an optical fiber transmission line transmitting the signal light;

an optical fiber for Raman amplification constituting at least part of said optical fiber transmission line; and

Stimulated-Raman-Scattering means which Raman-amplifies the signal light in said optical fiber amplification, by supplying Raman amplification pumping light,

wherein said Stimulated-Raman-Scattering means includes a pumping light source outputting the Raman amplification pumping light which includes a plurality of pumping

channels, and the plurality of pumping channels are assigned to the same part of said optical transmission line, and

wherein at least one of the pumping channels in the Raman amplification pumping light containing contains a plurality of longitudinal modes.

31. (Previously Presented) A system according to claim 30, wherein said transmitter includes a directly-modulation laser, and
wherein said optical fiber for Raman amplification has a negative chromatic dispersion at each signal channel.

32. (New) An optical transmission system comprising:
a transmitter outputting signal light in which a plurality of signal channels with an optical frequency spacing of 400 GHz or more but 12.5 THz or less are multiplexed;
an optical fiber transmission line transmitting the signal light;
an optical fiber for Raman amplification constituting at least part of said optical fiber transmission line; and

Stimulated-Raman-Scattering means which Raman-amplifies the signal light in said optical fiber for Raman amplification, by supplying Raman amplification pumping light,

wherein said Stimulated-Raman-Scattering means includes a pumping light source outputting the Raman amplification pumping light which includes a plurality of pumping channels, the wavelengths of the plurality of pumping channels being set such that the plurality of signal channels are located away from the Raman gain peak wavelength by 624 GHz to 1246 GHz.